

Commonwealth of Virginia Enterprise Architecture

Conceptual Architecture

Version 1.0

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1. Introduction

The broadly stated goal of enterprise architecture (EA) is to create a common and cohesive vision between business and technology leaders regarding:

- the emerging technology trends and enterprise business strategies that will drive the architecture;
- the IT requirements derived from enterprise business strategies;
- the role and definition of the technical architecture that best enables the business needs of the enterprise; and,
- the migration plan that will move the enterprise from the current to the future architecture.

EA does not start with technology. In the Commonwealth of Virginia, it starts with a strategic framework, the vision, goals, priority business activities, and enterprise business strategies of state government. Just as a building must be designed to suit its function and its site, IT must do more than simply address specific operational concerns. The effective use of information technology must be an integral part of the "business of state government" and must be deployed in ways that maximize the value to the citizens of the Commonwealth.

The primary goal of the Commonwealth of Virginia Enterprise Architecture is to establish an EA process which is focused on building and maintaining an enterprise-wide technical architecture (EWTA) that best enables the priority business activities of state government and that facilitates the adaptation of technology to the changing, business driven needs of the Commonwealth. The EA supports the Commonwealth E-Government initiative in this way.

As we begin development of Virginia's first statewide or enterprise level architecture, the goal is not just to deliver an EA that effectively meets present needs. Our goal is to design an ongoing process that will allow us to continually integrate and synchronize appropriate technologies to best serve the business of state government and the citizens of the Commonwealth. In short, a Commonwealth EA must be highly adaptive, providing continuous alignment between the business of state government and technology.

Work has already been done to identify and to agree on the business drivers and the requirements for the technical architecture as documented in the EA Common Requirements Vision. (See Appendix A.) The next step in the EA Process is to define a Conceptual Architecture that will serve as a foundation framework for an enterprise-wide technical architecture.

A Conceptual Architecture is a logically consistent set of principles that:
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| <ul style="list-style-type: none">• Are derived from business requirements;• Guide the engineering of an organization's information systems and technology infrastructure across the various component architectures;• Are understood and supported by senior Commonwealth management, State Agencies, Institutes of Higher Learning, and local governments;• Take into account the "full context" in which the enterprise-wide technical architecture will be applied; and• Enable rapid change in the Commonwealth's business processes and the applications that enable them. |
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The purpose of the Conceptual Architecture and of this document is to:

1. Provide an **Overview** describing the role of the Conceptual Architecture and the process for developing architecture.
2. Describe the architecture **Principles** that constitute the Conceptual Architecture.
3. Show the **Relationship between the Requirements for Technical Architecture (RTAs) and the Conceptual Architecture Principles (CAPs)**.
4. List and define the component architectures, referred to as "**Domains**", that will be implemented to support the Architecture.
5. Show the **High-level Relationship between the Conceptual Architecture Principles and the Domains**.
6. Provide a **Conclusion** with a vision of what is possible through the implementation of the Conceptual Architecture Principles.

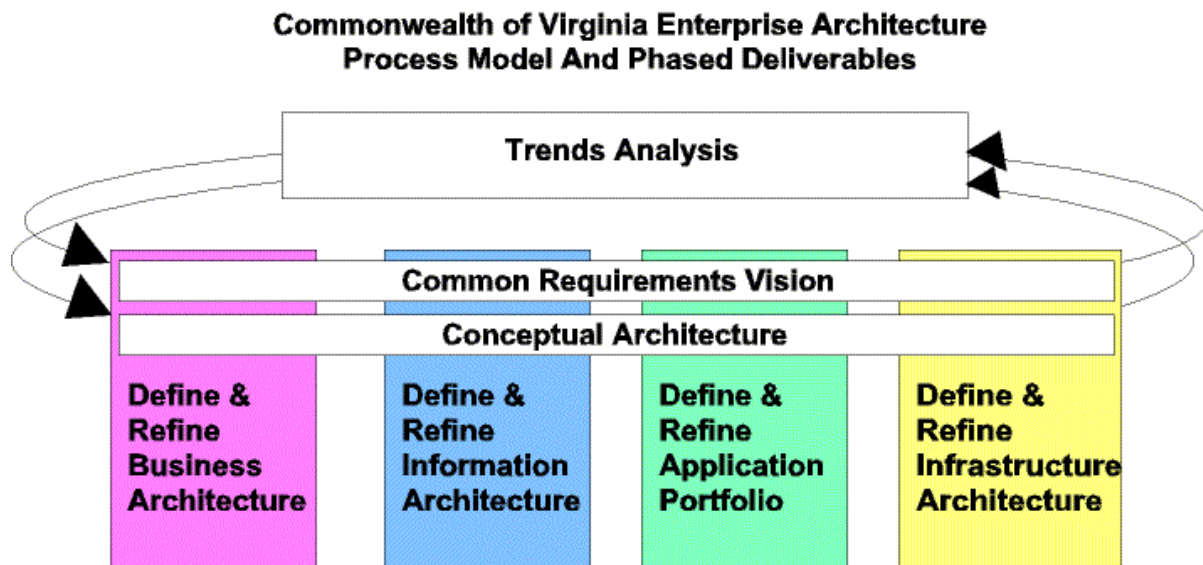
2. Objective

The Conceptual Architecture will serve as a foundation framework on which the Commonwealth of Virginia and its member agencies can build a technological infrastructure to facilitate the responsible and expeditious deployment of the Commonwealth's information assets. It will provide high-level guidance for aligning business drivers and architectural requirements with the underlying technological components to meet the vision of the Enterprise Architecture. It will define a logically consistent set of principles that will guide engineering across domain architectures. And, it will identify and verify the necessary Domain Architectures.

3. Overview

The Conceptual Architecture identifies applicable Enterprise Architecture best practices as Conceptual Architecture Principles (CAP's). Based on these CAPS, the Conceptual Architecture enables the enterprise to identify strengths and weaknesses in current IT delivery methods, policies, skills, and organization. It further provides a baseline to assess the applicability and appropriateness of the current technology products deployed by the enterprise. Finally, it provides a framework to derive, prioritize, and "drill down" into necessary Domain architectures. Figure 1, "Building the Architecture" (below), graphically illustrates this process.

Figure 1 – "Building the Architecture"



4. Conceptual Architecture Principles (CAP's)

Conceptual Architecture Principles (CAP's) are high-level fundamental truths, ideas or concepts that frame and contribute to the understanding of the Enterprise Architecture. They are derived from best practices that have been assessed for appropriateness to the Commonwealth Enterprise Architecture. The justifications and implications of each CAP are identified and documented within the context of the Commonwealth organization. And, there is a direct linkage between each Conceptual Architecture Principle to one or more of the Requirements for Technical Architecture that were identified by the Commonwealth Requirements Visions (see Appendix A). A matrix depicting the relationship between CAP's and RTA's is displayed in Section 5.

The following eleven Conceptual Architecture Principles were mutually agreed upon by the COTS-EA Workgroup in January 2001:

Conceptual Architecture Principle 1: Security

The Enterprise Architecture must enable secure communications and appropriate protection of information and technology.

Rationale:

- The Commonwealth's resources are valuable and must be protected.
- The Commonwealth's Internet presence conveys important information and services to the public and presents views of the government that represent the vision of elected officials. The services, information and views must be protected.
- The Commonwealth's agencies and representatives must comply with legal requirements, policies, and regulations pertaining to confidentiality, integrity, and availability.

Driving RTA's:

RTA09 The Enterprise Architecture must support mechanisms to detect and resolve data discrepancies, incomplete data and incorrect data.

RTA13 The Enterprise Architecture must protect the confidentiality and integrity of data being stored or transmitted.

RTA14 The Enterprise Architecture must support multiple levels of security, access control and audit capability.

RTA15 The Enterprise Architecture must facilitate ease of access to information within the constraints of privacy and security.

Key Actions:

1. The domain team should provide broad guidance to agencies to ensure full protection of resources and communications.
2. Agencies must address employee awareness related to security needs and measures taken.
3. The domain teams should consider ease of administration of policies, procedures and technologies recommended.
4. The domain team should address audit issues related to agency procedures and audit trails for unauthorized changes; and should recommend controls for secure communications.
5. Over time, the State needs to migrate to open, standard-based security solutions.

Implications:

In providing for adequate security, the Commonwealth and its agencies will have to carefully weigh costs and benefits from the perspectives of both the protectors and the users of resources and services. Just enough security, well managed, easily used, appropriate to the needs, and affordable is the goal. From an Enterprise Architecture perspective, it will be important for domain teams to focus on those aspects of security related to information resources, person-to-person and process-to-process telecommunications services, and information technology assets.

Conceptual Architecture Principle 2: Transparency

The Enterprise Architecture must provide transparency to the end users.

Rationale:

- Customers want information and services provided in logical groupings from their perspective (help for travelers or services for small business owners), not content divided by responsible agency. Transparency means not having to know the agency, database, access tools, or other unnecessary information.
- Customers prefer a single sign-on and a consistent presentation of data, regardless of which agency is the provider.

Driving RTA's:

RTA05 The Enterprise Architecture must provide the capability to locate and present information seamlessly based on the requestor's needs and context, without requiring the requestor to know in advance the source or location of the information.

RTA06 The Enterprise Architecture must support delivery of the latest relevant information.

RTA16 The Enterprise Architecture must enable flexible sharing of service delivery channels to provide seamless customer service.

RTA18 The Enterprise Architecture must facilitate delivery of education services to citizens of all ages across multiple delivery options, including non-traditional times and locations wherever citizens need to learn.

RTA25 The Enterprise Architecture must facilitate collaborative development of applications and related technology projects by organizations whether or not physically co-located.

RTA27 The Enterprise Architecture must enable deployment of common applications in both centralized and decentralized implementation as appropriate.

Key Actions:

1. The domain teams should promote transparency by providing agencies with recommendations related to interface standards (e.g., search methods and discovery options), directory standards, metadata standards, and other services necessary to create more uniform access. Greater uniformity will result in greater transparency for the user.
2. The domain teams should encourage agencies to consider the transparent view needs of all major types of users, including businesses, government agency, staff, students, vendors, etc.
3. The domain teams, agencies, and central service providers must consider a single sign-on to simplify the making of secure transactions with government.
4. The domain teams may wish to recommend a centrally provided PIN for secure customer transaction.

Implications:

Promoting transparency for the user will have the dual effect of providing well regarded, usable interfaces and providing design and technical consistency across government. Although the main benefit of consistency is intended for the users, a side benefit is transferable workforce knowledge and skills.

Conceptual Architecture Principle 3: User Preferences

The Enterprise Architecture must be adaptive to user preferences and be user empowering.

Rationale:

- Virginia government places a high value on good customer service.
- Customer interfaces that enable end-users to indicate preferences promote service use, acceptance, efficiency, and satisfaction. As service use increases, services become more cost-effective.

- Government workers are an important customer group. A work environment that permits differentiation of worker preferences within a common architecture, facilitates use of tools, personal productivity, and job satisfaction.
- Citizens expect government to empower them. Their expectations are being influenced by private sector service delivery initiatives (e.g., the availability of Internet banking services day or night and the ability to order goods from home or from a hotel).
- The Commonwealth must demonstrate due diligence in providing services equitably to the public regardless of language, physical ability, education level, or ability to access to technology.

Driving RTA's:

RTA03 The Enterprise Architecture must provide mechanisms to determine and adapt to the service delivery preferences of customers.

RTA04 The Enterprise Architecture must support implementation of multiple service delivery channels for the same service utilizing common underlying information and systems to enable rapid response to changes in business requirements.

RTA05 The Enterprise Architecture must provide the capability to locate and present information seamlessly based on the requestor's needs and context without requiring the requestor to know in advance the source or location of the information.

RTA07 The Enterprise Architecture must enable provision of automated services consistent with customer needs and expectations in a cost effective and appropriate manner.

RTA08 The Enterprise Architecture must provide mechanisms to collect, continuously update, and use customer service and cost information. This includes: quantitative and qualitative information on customer needs; the quality, usefulness and access frequency of information or services; and the total cost of implementation and operation of service providing mechanisms.

RTA10 The Enterprise Architecture must support collection and use of customer demographic data to allow customized delivery of services to a broad range of customer groups including those with special needs.

RTA11 The Enterprise Architecture must support collecting data on service delivery success linked to customer characteristics to facilitate provision of tailored services to different customer segments.

RTA15 The Enterprise Architecture must facilitate ease of access to information within the constraints of privacy and security.

RTA18 The Enterprise Architecture must facilitate delivery of education services to citizens of all ages across multiple delivery options, including non-traditional times and locations wherever citizens need to learn.

Key Actions:

1. Agencies should identify parameters representing user preferences.
2. Agencies should share information on customer preferences.

3. Domain teams should recommend procedures and/or mechanisms to facilitate sharing of interface design information across agencies.
4. Providing options can be costly. Domain teams should encourage agencies to consider costs and benefits. Iterative development approaches using customer input on needs and utility may be warranted. Lessons learned by agencies should be shared.
5. Many agencies have similar business partners and customer groups. These agencies may provide similar services (e.g., services to individuals based on eligibility) or service access methods. These patterns will become increasingly evident over time if customer information is shared across agencies. The domain teams can facilitate reuse of applications and preference options by ensuring mechanisms for the sharing of information across agencies. Sharing will also foster awareness of the architecture patterns among sister agencies (e.g., within a secretariat) and the importance of open solutions.
6. Agencies may also share help tools that foster the alignment of the user with a desirable and effective “user preference.”

Implications:

A focus on flexible delivery mechanisms, customer preference awareness, and sharing of customer interface related information across the Commonwealth will result in an architecture sensitive to user preferences.

Conceptual Architecture Principle 4: Extensible and Open

The Enterprise Architecture must be flexible, scalable, adaptable, enduring, extensible, and open.

Rationale:

- When systems are more flexible, scalable, adaptable, and extensible, they better enable rapid response to changing needs.
- When systems are more enduring and open, they are more cost effective due to extended utility and broader selections of vendors for adding new or replacement solutions.
- The Commonwealth should be able to expand or contract its infrastructure in concert with shifts in demand for services, without sacrificing response time or efficiency.
- Where change is continuous, a common architecture (as described above) is needed to support responsiveness during service fluctuations, continuity during service growth, and longevity during times of stability, with minimal business process disruption.
- Within a dynamic environment, the return on investment in information technology assets can be maximized when those assets are resilient to change, and when their value is sustained or enhanced over the expected life cycle.
- Open systems facilitate the porting of applications without extensive retooling.

Driving RTA's:

RTA16 The Enterprise Architecture must enable flexible sharing of service delivery channels to provide seamless customer service.

RTA19 The Enterprise Architecture must provide a flexible and scaleable infrastructure to support rapid fluctuations in demand.

RTA21 The Enterprise Architecture must support rapid deployment and dependable operation of robust and flexible procurement systems to enable expeditious and efficient procurement of goods and services.

RTA23 The Enterprise Architecture must support flexible implementation based on industry standards consistent with mainstream trends.

RTA29 The Enterprise Architecture must enable strategic prototyping of new technologies, and rapid deployment of technologies and service delivery mechanisms determined to be effective, stable, and appropriate.

Key Actions:

1. Domain teams should identify standards for platforms, databases, the network, security, systems management, information, applications, and middleware that will move the Commonwealth towards more open systems.
2. The domain teams should identify any exceptions to the above qualities that are acceptable and under what circumstances. (An example may be patching legacy systems as an alternative to cost-prohibitive replacement.)
3. The domain teams may want to recommend the establishment of procurement procedures for IT assets that require agencies to review product specifications for adherence to open standards and require agencies to justify any variances from those standards in the winning product.
4. Domain teams may wish to develop "transition guidelines" for legacy components that emphasize the transition to architecture components with the desirable characteristics noted in this principle.

Implications:

Although the qualities listed in this principle are ideals that cannot be fully achieved at this time, attention to the qualities listed will ensure that the Commonwealth will have more cost-effective systems that can respond rapidly to changing needs.

Conceptual Architecture Principle 5: Location Independence

The Enterprise Architecture must promote consistency, reliability, and timeliness, regardless of location.

Rationale:

Solutions must be identified regardless of location, and solutions should be location sensitive when necessary. For example:

- Customers may demand variety in service options;
- Customers would like to be mobile without their mobility affecting service availability and quality;
- Customers may need location relevant information and services.

Driving RTA's:

RTA02 The Enterprise Architecture must enable deployment of appropriate service delivery directly to customers using cost effective technologies.

RTA05 The Enterprise Architecture must provide the capability to locate and present information seamlessly based on the requestor's needs and context without requiring the requestor to know in advance the source or location of the information.

RTA07 The Enterprise Architecture must enable provision of automated services consistent with customer needs and expectations in a cost effective and appropriate manner.

RTA18 The Enterprise Architecture must facilitate delivery of education services to citizens of all ages across multiple delivery options including non-traditional times and locations wherever citizens need to learn.

RTA27 The Enterprise Architecture must enable deployment of common applications in both centralized and decentralized implementation as appropriate.

RTA28 The Enterprise Architecture must facilitate implementation of a high capacity and high availability technology infrastructure in all parts of the Commonwealth, in cooperation with business and industry that will attract businesses to the Commonwealth and promote widespread economic growth.

Key Actions:

1. The domain teams should ensure that their architecture components deliver services and information regardless of the location of the user.
2. Service providers should consider geography when designing services.
3. Domain teams should include guidance for considering when location information is significant.

Implications:

The future architecture will address location issues and will make location a lesser restriction on service delivery.

Conceptual Architecture Principle 6: Manageable and Serviceable

The architecture must be internally manageable or externally serviceable to meet ongoing support requirements in an effective and efficient manner.

Rationale:

A significant component of the total cost of ownership of a technology is the cost of supporting the technology. Government must not implement new technologies unless assured of being able to manage and support them in a cost effective manner.

Driving RTA's:

RTA17 The Enterprise Architecture must enable exchange of information about knowledge, skills and abilities (KSA) required for the workforce and about availability of KSA in the workforce between all levels of government and the business community.

Key Actions:

1. The domain teams should encourage agencies to consider whether the workforce is adequate to support the installation and management of technologies being considered and/or whether existing staff have, or are able to acquire in a timely fashion, the necessary knowledge and skills to support the proposed technologies.
2. Domain teams should consider recommending mechanisms by which the Commonwealth might more rapidly develop a high level of expertise to support new technologies. (For example, the hiring of a central pool of high expertise individuals to provide support to agency personnel on the new technology might be a cost-effective option.)

Implications:

Workforce considerations are extremely important in deciding whether a technology should be recommended as a future technology. Even a proven, cost-effective technology that works well in one instance may be inappropriate in another instance because a knowledgeable and skilled workforce is not available, the retraining of the existing workforce is cost-prohibitive, or skill acquisition would be untimely. The Enterprise Architecture envisioned for the future will be strengthened by sensitivity to internal and external support availability issues.

Conceptual Architecture Principle 7: Interoperability

The Enterprise Architecture must be able to interoperate within and across agencies and between agencies and their external business partners.

Rationale:

To enable the work of government, agencies need to combine data across systems; agencies need to share data with other agencies; users need to access information and services from varied sources; and businesses and governments need to interface. Government work demands interoperability.

Driving RTA's:

RTA01 The Enterprise Architecture must facilitate provision of information as a primary service of government in the information age.

RTA06 The Enterprise Architecture must support delivery of latest relevant information.

RTA09 The Enterprise Architecture must support mechanisms to detect and resolve data discrepancies, incomplete data and incorrect data.

RTA16 The Enterprise Architecture must enable flexible sharing of service delivery channels to provide seamless customer service.

RTA17 The Enterprise Architecture must enable exchange of information about knowledge, skills and abilities (KSA) required for the workforce and about availability of KSA in the workforce between all levels of government and the business community.

RTA24 The Enterprise Architecture must support multiple sets of standards to ensure interoperability.

RTA25 The Enterprise Architecture must facilitate collaborative development of applications and related technology projects by organizations whether or not physically co-located.

RTA26 The Enterprise Architecture must facilitate distributed project management.

RTA27 The Enterprise Architecture must enable deployment of common applications in both centralized and decentralized implementation as appropriate.

Key Actions:

1. Domain teams should encourage agencies to strive for interoperability by avoiding proprietary solutions, embracing standards, and promoting open systems.
2. The middleware domain team should identify the best tools for providing application-to-application, database-to-database, and other types of interoperation between new and legacy components.

Implications:

Interoperability is a fundamental prerequisite to effective and efficient use of technology to do business in a multi-tiered network environment. Virginia's future technical

architecture will require that most systems, where data and applications reside, enable interoperability, especially in servicing Internet customers.

Conceptual Architecture Principle 8: Data Capture and Sharing

The Enterprise Architecture must facilitate capturing data once, capturing valid and reliable data, and sharing information resources maximally.

Rationale:

Information is an important product of government business. The quality data underpinning government information resources requires much effort on the part of providers and responsible parties. Any tools that might assist agencies in reducing data burden or improving quality and timeliness would be very useful to all agencies in the conduct of their core business.

Driving RTA's:

RTA01 The Enterprise Architecture must facilitate provision of information as a primary service of government in the information age.

RTA09 The Enterprise Architecture must support mechanisms to detect and resolve data discrepancies, incomplete data and incorrect data.

RTA16 The Enterprise Architecture must enable flexible sharing of service delivery channels to provide seamless customer service.

RTA22 The Enterprise Architecture must enable collection, analysis and sharing of procurement performance information to support a well managed and auditable procurement process.

RTA24 The Enterprise Architecture must support multiple sets of standards to ensure interoperability.

Key Actions:

1. Domain teams should maximize the use of standards-based technologies to ensure interoperability needs for data sharing.
2. Domain teams should encourage agencies to share successful data collection and validation strategies and technologies, thus promoting reuse of proven approaches. Domain teams should identify technologies that facilitate the reuse of captured data.
3. The domain teams may wish to consider an enterprise-level metadata repository that provides common data definitions and associated validation requirements for data collected, created, used, and shared by agencies, and/or that facilitates conducting business with outside entities and government bodies.
4. Domain Teams need to define standards, best practices, and guidelines that facilitate accurate and efficient data entry, data validation, data transformation, data retrieval,

data storage, and data sharing, giving due consideration to existing Federal Government and Industry standards.

5. Domain team needs to address the role and deployment of an Enterprise Data Warehouse for maximizing data quality and data sharing, and for providing economies of scale.

Implications:

The Enterprise Architecture will promote enhanced tool sets for conducting a core agency business, with the provision of information based on valid and reliable data.

Conceptual Architecture Principle 9: Cooperation

The Enterprise Architecture must enable cooperation among agencies, business partners and customers.

Rationale:

Cooperation promotes the flow and exchange of customer, government, business, and technical information between entities, employees and citizens. It supports the sharing of resources and costs, the achievement of economies of scale, and the minimization of redundancy. Inter-Agency cooperation enables the Commonwealth to deliver services to customers and to transact business via a consistent, common approach, which promotes usability and enhances productivity.

Driving RTA's:

RTA12 The Enterprise Architecture must provide infrastructure that facilitates collection, analysis and sharing of recruitment data, retention data, and workforce availability information across all levels and branches of government.

RTA16 The Enterprise Architecture must enable flexible sharing of service delivery channels to provide seamless customer service.

RTA17 The Enterprise Architecture must enable exchange of information about knowledge, skills and abilities (KSA) required for the workforce and about availability of KSA in the workforce between all levels of government and the business community.

RTA24 The Enterprise Architecture must support multiple sets of standards to ensure interoperability.

RTA25 The Enterprise Architecture must facilitate collaborative development of applications and related technology projects by organizations whether or not physically co-located.

RTA26 The Enterprise Architecture must facilitate distributed project management.

RTA27 The Enterprise Architecture must enable deployment of common applications in both centralized and decentralized implementation as appropriate.

Key Actions:

1. All domain teams should consider the effects of decisions on opportunities for cooperation.
2. All domain teams should, when making architectural decisions, consider that each agency has multiple and different customers, partners, and stakeholders with whom they interface.
3. Domain teams should consider tools to support cooperation, including communications, distributed project management, directory services, access services, cross-agency security management, collaborative application development, interagency portal management, etc.

Implications:

The Enterprise Architecture of the future will be a significant enabler of “cooperation” that will result in significant cost savings and enhanced products. Attention to the importance of cooperation as recommendations are developed will greatly enhance the utility of the Enterprise Architecture.

Conceptual Architecture Principle 10: Best Value Driven

The Enterprise Architecture must facilitate the measuring of benefits against costs and be “best value driven”.

Rationale:

In an atmosphere where complex and ever-changing systems are supporting all aspects of our business every hour of the day, it is easy to lose track of costs and benefits. And yet, these critical measures are fundamental to good decision-making. The Enterprise Architecture can and must assist in accounting for use, for change, for costs, and for effectiveness. Total costs of present and proposed alternatives, including unintended consequences and opportunities missed, must be a part of our decisions as we build the architecture of the future.

Driving RTA's:

RTA02 The Enterprise Architecture must enable deployment of appropriate service delivery directly to customers using cost effective technologies.

RTA03 The Enterprise Architecture must provide mechanisms to determine and adapt to the service delivery preferences of customers.

RTA07 The Enterprise Architecture must enable provision of automated services consistent with customer needs and expectations in a cost effective and appropriate manner.

RTA08 The Enterprise Architecture must provide mechanisms to collect, continuously update, and use customer service and cost information. This includes: quantitative and qualitative information on customer needs; the quality, usefulness and access frequency of information or services; and the total cost of implementation and operation of service providing mechanisms.

RTA10 The Enterprise Architecture must support collection and use of customer demographic data to allow customized delivery of services to a broad range of customer groups including those with special needs.

RTA11 The Enterprise Architecture must support collecting data on service delivery success linked to customer characteristics to facilitate provision of tailored services to different customer segments.

RTA20 The Enterprise Architecture must enable capacity, performance and configuration management, using real-time and historical metrics.

RTA22 The Enterprise Architecture must enable collection, analysis and sharing of procurement performance information to support a well managed and auditable procurement process.

RTA29 The Enterprise Architecture must enable strategic prototyping of new technologies and rapid deployment of technologies and service delivery mechanisms determined to be effective, stable, and appropriate.

Key Actions:

1. The domain teams may wish to propose that new technologies be evaluated on a statewide basis.
2. The domain teams should recommend tools and technologies that provide useful metrics for estimating costs and benefits of existing approaches.
3. The domain teams may wish to recommend strategies and procedures to enhance sharing cost and benefit information across agencies.
4. Total Cost of Ownership (TCO) concepts should be considered by the domain teams when recommending future directions and by agencies when making architectural decisions.
5. The Project Management team should propose project management models that include the assessment of costs and benefits associated with technology investments throughout the life of the technology.

Implications:

To the extent that the Enterprise Architecture can provide tools, methods, or data to assist agencies in gathering information useful in comparing costs and benefits, a great service will be provided to the Commonwealth. The future Enterprise Architecture will make cost and benefit analysis tools a high priority and will incorporate the use of such analyses in planning decisions and in management of solutions.

Conceptual Architecture Principle 11: Reusability

The Enterprise Architecture must promote reuse of necessary and appropriate components.

Rationale:

Reuse is a very important concept. Reusability is a fundamental benefit of employing component or object models, but can extend beyond objects (encapsulated code and data). Other possibilities are:

- Reusable data (meaning)
- Reusable function (process)
- Reusable location (hardware/ software)
- Reusable people (skills)
- Reusable time (cycles)
- Reusable motivation (rules)
- Reusable Object Code
- Reusable Source Code
- Reusable Design
- Reusable Specifications
- Reusable Requirements
- Reusable Plans

Reuse is cost beneficial. Reuse also reduces development time, thus accelerating the delivery of solutions.

Driving RTA's:

RTA12 The Enterprise Architecture must provide infrastructure that facilitates collection, analysis and sharing of recruitment data, retention data, and workforce availability information across all levels and branches of government.

RTA27 The Enterprise Architecture must enable deployment of common applications in both centralized and decentralized implementation as appropriate.

RTA29 The Enterprise Architecture must enable strategic prototyping of new technologies and rapid deployment of technologies and service delivery mechanisms determined to be effective, stable, and appropriate.

Key Actions:

1. Domain Teams should recognize the importance and value of reuse of appropriate software, design components, etc. and define standards and/or good practices that promote reuse.
2. Agencies should identify business needs that may be addressed with reusable components.

3. Domain Teams must identify standards, best practices, and products that promote reuse, foster interoperability, reduce enterprise complexity, and minimize the need to develop custom solutions.

Implications:

Presently, reuse is a concept that is most often promoted as part of object-oriented analysis, design, and programming. To the extent that object concepts become increasingly important in Virginia government, reuse will increase in importance as a concept. Also, in times of waning resources, reuse is critical. The Enterprise Architecture will support reuse through the storage of, and the access to, reusable objects; and through providing accounting and access mechanisms for other reusable resources.

5. Requirements for Technical Architecture/Conceptual Architecture Principles Matrix

The following matrix shows which RTA's are supported by which CAP's.

Requirements for Technical Architecture	Conceptual Architecture Principles										
	CAP1	CAP2	CAP3	CAP4	CAP5	CAP6	CAP7	CAP8	CAP9	CAP10	CAP11
RTA01							◆	◆			
RTA02					◆					◆	
RTA03			◆							◆	
RTA04			◆								
RTA05		◆	◆		◆						
RTA06		◆					◆				
RTA07			◆		◆					◆	
RTA08			◆							◆	
RTA09	◆						◆	◆			
RTA10			◆							◆	
RTA11			◆							◆	
RTA12									◆		◆
RTA13	◆										
RTA14	◆										
RTA15	◆		◆								
RTA16		◆		◆			◆	◆	◆		
RTA17						◆	◆		◆		
RTA18		◆	◆		◆						
RTA19				◆							
RTA20										◆	
(Continued on next page)											
LEGEND: ◆ High Applicability											

Requirements for Technical Architecture	Conceptual Architecture Principles										
	CAP1	CAP2	CAP3	CAP4	CAP5	CAP6	CAP7	CAP8	CAP9	CAP10	CAP11
RTA21				◆							
RTA22								◆		◆	
RTA23				◆						◆	
RTA24							◆	◆	◆		
RTA25		◆					◆		◆		
RTA26							◆		◆		
RTA27		◆			◆		◆		◆		◆
RTA28			◆							◆	
RTA29										◆	
<p>LEGEND:</p> <p>◆ High Applicability</p>											

6. Domain Architectures

The Enterprise-Wide Technical Architecture (EWTA) is typically divided into sets of related technologies and components, referred to as "domains." The purpose of a Domain Architecture is to provide a combination of domain principles, best practices, methods, products and configurations that represent "reusable building blocks". Thus, the Domain Architecture provides the technical components within the Enterprise Architecture that enable the business strategies and functions. Note, ***the Conceptual Architecture serves as the foundation for the Domain Architectures***, and ensures that they are aligned and compatible with one another. To date, the COTS-EA Workgroup has identified and approved the following nine domains (below) for inclusion in the EWTA. It was further agreed that the Network, Security, and Middleware domains would be given highest priority, in order to support the Commonwealth E-Government initiatives.

Component Name	Definition
Network	The Network Architecture defines the communications infrastructure for the Commonwealth. It defines the various topologies, carrier services and protocols necessary to facilitate the interconnection of the Commonwealth's institutions of government and education. Included in this architecture is the definition of both internal networks and connections to external networks.
Middleware	The Middleware Architecture defines the components that create integration among the client and server systems to improve the overall usability of the distributed architecture. Middleware provides interfaces between applications and network communications. Middleware architecture includes such things as message brokers, XML and directory structures used to facilitate interconnection of systems and applications.
Security	The Security Architecture defines the technologies, security standards and policies necessary to both protect the information assets of the Commonwealth and to make the information available to the Commonwealth workforce and citizens. The security architecture includes definitions of such things as Public Key Infrastructure (PKI) and digital signatures.
Platform	The Platform Architecture defines the client and server computing platforms, and the operating systems interfaces supported. Components of the platform domain range from enterprise class servers to workstations and hand held computing devices and the operating systems (not applications) that run on these devices.

Database	The Database Architecture defines the technical components of the software systems that support storage and retrieval of data. Database architecture defines the types of database software that will support the applications.
Cost Allocation	The Cost Allocation Architecture defines the policies, procedures, standards and systems required to allocate the cost for the infrastructure components and support. Emphasis is on facilitating rapid deployment of shared resources while maximizing the benefit of multiple funding sources and types.
Systems Management	The Systems Management Architecture defines how the hardware and software components of the infrastructure will be monitored and controlled. Systems management includes the automation and control of platforms and associated resources, networks and applications and the coordination and control of work flowing through the infrastructure systems. It focuses on issues of configuration management, event and state management, fault detection and isolation, performance measurement, and problem reporting.
Information	The Information Architecture describes the logical structure of databases and the methodology used to correlate data in multiple databases. The information architecture provides a framework for defining responsibility for data integrity and distribution.
Application	The Application Architecture defines how applications are designed and how they cooperate. Application architecture promotes common presentation standards to facilitate rapid training and implementation of new applications and functions. Good application architecture enables a high level of system integration, reuse of components and rapid deployment of applications in response to changing business requirements.

7. Conceptual Architecture Principles/Domain Architectures Matrix

This matrix is a high-level graphic that shows which Domains are most greatly impacted by each CAP. Development of these Domains should enable the resulting domain architecture to explicitly support the “related” CAP. Note, in practice, each Domain Team will examine the applicability of *each* of the Conceptual Architecture Principles as they define the appropriate technology component mix for that Domain architecture.

Component Architecture Principle (CAP)											
Domain Team	CAP1	CAP2	CAP3	CAP4	CAP5	CAP6	CAP7	CAP8	CAP9	CAP10	CAP11
Platform		◆		◆	◆	◆				◆	◆
Database		◆		◆	◆	◆		◆	◆	◆	◆
Network	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Security	◆	◆		◆		◆	◆	◆	◆	◆	◆
Systems Management	◆	◆		◆	◆	◆			◆	◆	◆
Information				◆		◆	◆	◆	◆	◆	◆
Application		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Middleware	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Cost Allocation							◆			◆	◆
<p>LEGEND:</p> <p>◆ High Applicability</p>											

8. Conclusions

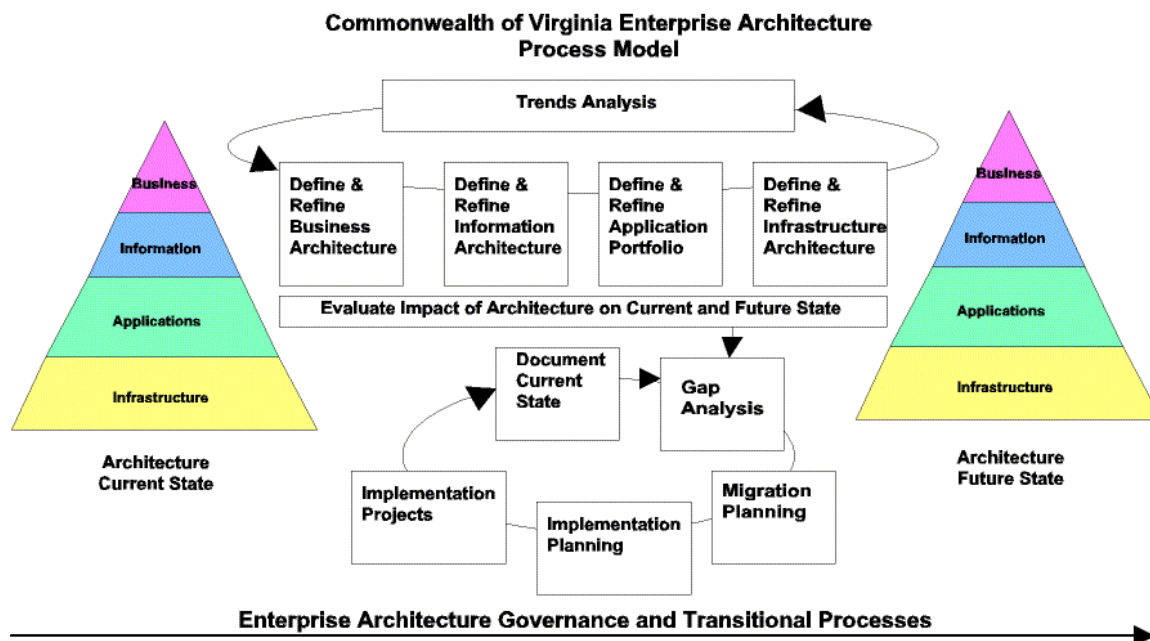
The creation of the Conceptual Architecture Principles facilitates and supports the establishment of a common technology vision across the enterprise and builds consensus and understanding through continuous dialogue between the different domain architecture teams. This moves issues and concerns into an open forum, where decisions are made using the consensus approach. The Principles enable the organization to integrate various components of the technology into the overall business vision by providing auditable linkages back to the business change drivers. They help to ensure that not only are business rules enforced, but a principle-based model is used in the governance of deployment.

The Principles provide guidance, in lieu of defined standards, while the architecture effort continues to evolve to a comprehensive set of product and configuration standards. These principles should enable faster deployment of new technologies by providing the common framework that will reduce the need to reassess each individual domain. This common framework, i.e. the Conceptual Architecture, will ensure that systems are defined logically as well as independent of technology constraints.

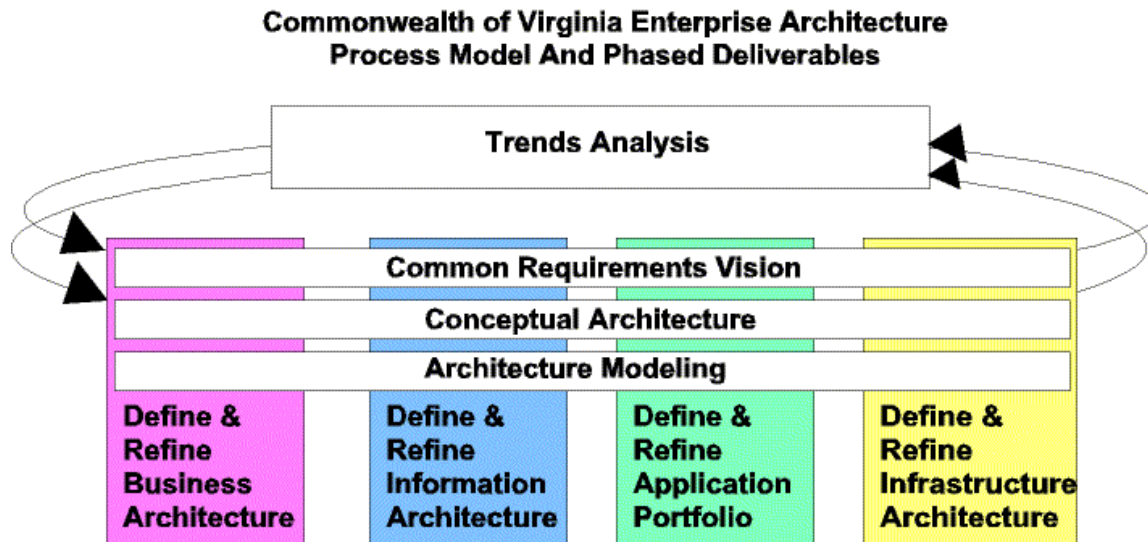
These principles also establish a common direction and consistent use of technical terms and components. This common language and common inventory will enhance communications and streamline business understanding. As a result, IT's environment complexity will be reduced as redundant standards and components are eliminated. And lastly, this consistent set of principles will facilitate cost avoidance as it limits the purchase of technologies outside of the Principles.

9. Next Steps

The graphic overview of the Enterprise Architecture Process Model below shows the development flow of the “to-be” architecture (upper loop), and the implementation of that architecture (lower loop). It supports an iterative approach which allows for adjustments and refinements to the enterprise architecture over time in response to technology, government and business changes.



Once the foundational set of principles that constitute the Conceptual Architecture have been established (see Section 4 above), the EA Process moves forward with defining, modeling and analyzing the components need to support that architecture, referred to in the diagram below as “Architecture Modeling”.



Based on the EA Process Models above, the following five major activities outline the next steps required to develop and establish the desired Commonwealth Enterprise-Wide Technical Architecture (EWTA):

1. **Develop Domain Architectures:** The Domain Architecture Teams will continue to define and document the Domain principles, best practices, and components required in support of the “Common Requirements Vision” and “Conceptual Architecture”. This development will proceed in the priority order established by COTS. Note, as a deliverable, a “future model” of each Domain will be created.
2. **Baseline Areas of Proposed Change:** The Domain Teams will document and model the current environment and technology baseline that composes the “current state” of their Domain architecture.
3. **Perform Gap Analyses:** Domain Teams will analyze the existing technology mix to determine to what extent it is not able to meet the new requirements identified by the desired future architecture design. These “gaps”, and their impact on the CAP’s, will be documented. Alternatives to close the gaps will be developed, evaluated, and recommended by the Domain Teams.
4. **Conduct Migration Planning:** The EA Workgroup and Domain Teams will work together to identify projects, initiatives, and policies that need to be implemented in support of the proposed EWTA. The scope, needs, migration path, timing, business case and interdependencies of each proposed project will be identified, evaluated and prioritized.

5. ***Implementation Planning:*** A detailed EWTA Program Plan and timeline will be developed to serve as the coordinating plan across all recommended projects and actions (from Step 4 above).

Appendix A: EA Common Requirements Vision

The Commonwealth of Virginia “EA Common Requirements Vision” can be reviewed in its entirety by linking to the following website:

www.sotech.state.va.us/cots/ea/vision.htm

Appendix B: CA Document Revision History

Release	Description	Date
1.0	Initial COTS-EA Work Group Release	February 15, 2001